rest of the flock. I have sent the damaged skin to the Provincial Museum at Regina.

In the summer of 1915, two living albino specimens of Richardson's spermophile (*Citellus richardsoni*) were sent to this university from near Hanley, Sask. I saw them, but through carelessness they were both lost before further data were obtained.

An albinistic crow of a very light brown shade is among the stuffed birds of the university collection. Beyond the fact that it was taken in Saskatchewan, I have been unable to learn anything about it.

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A PLEA FOR MORE EXPLICIT DESIGNATION OF SCIENTIFIC REPRINTS

THE library of the Bureau of Fisheries contains one of the largest, if not the largest, collection of reprints on the subject of aquatic biology. It is the practise of the bureau to make analytical cards of all such separates, copy being furnished the Library of Congress by which the cards are printed. These cards become part of the Library of Congress issue and have world-wide distribution.

That the cards may be used with confidence by those needing them for bibliographical purposes and unable to consult the volumes in which they have appeared, it is necessary that the cards not only show the source of the reprints but also give the place of publication, date, volume, and pagination. Unfortunately separates are frequently devoid of such data. It is astonishing indeed that a great number of reprints are found to be without indication of the year of publication; many give no reference to the journal from which they are reprinted; and nearly all lack mention of the place of publication. Frequently the publication in which the article originally appeared is not available; but even when it is at hand the librarian has no right arbitrarily to give the place of publication of the original as that of the reprint, unless the reprint so states. Difficulty is frequently encountered with reprints which carry only a caption title and bear no date of issue; in such cases, it may be possible to give the date which appears on the title page of the volume (provided the volume is available) but frequently the issue of the volume is antedated by the separate. The date of first publication is of paramount importance in certain instances, as every investigator knows.

The Bureau of Fisheries has endeavored to establish a standard of high efficiency in the bibliographies attached to its publications, and publishes none submitted until they have been fully verified. If all reprints consulted by authors compiled with the simple and obvious requirements of bibliographical reference, much labor would be saved and greater accuracy assured. Under present conditions much time is frequently required, to locate original papers and, failing in this, it is sometimes necessary to return bibliographies to the investigators, only to find that, in some cases, they have seen only the separates and can not therefore authoritatively supply the necessary data.

It is of course of vital interest to investigators that their papers be cited correctly and it is therefore important that every author see to it that his reprints indicate not only the source, but also place, date, volume and pagination. This end could readily be accomplished with the cooperation of editors and publishers of scientific journals, proceedings and transactions of scientific societies, and state and institutional reports and bulletins. The slight additional labor involved would be fully justified by the saving of time and worry of other investigators, librarians and editors, and by the prevention of confusing errors of citation.

ROSE M. MACDONALD
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WASHINGTON, D. C.

SCIENTIFIC BOOKS

Report of the Second Norwegian Arctic Expedition in the "Fram," 1898–1902, 4 volumes in 36 parts, large octavo, 1907–1919, 9 maps, 111 plates, and 2,071 pages of text. Published by the Society of Arts and Sciences of Kristiania (Videnskabs-Selskabet i Kristiania), at the expense of the Fridtjof

Nansen Fund for the Advancement of Science.

During the first Norwegian Arctic expedition, when the attaining of the North Pole by Nansen was the main object, Captain Otto Sverdrup expressed the desire to return to Arctic lands for exploration and mapping of portions of the American Arctic island archipelago. The fulfilment of this desire was made possible through gifts of about $60,000 by Consul Axel Heiberg and the Ringnes brothers, brewers in the city of Kristiania, the same three men whose generosity made possible the first Arctic expedition in the *Fram*. This staunch vessel, repaired and ready for a second time to pass through the ordeal of ice-bound seas, was the Storthing's contribution to the expedition. A more productive exploration of Arctic lands, with so small a sum of money, has not been made before, and the names of the donors are now permanently fixed in geography in the new islands, Axel Heiberg Land, Amund Ringnes Land and Ellef Ringnes Land. The expedition explored and mapped about 100,000 square miles, the greater part of which is new territory. Like most Arctic explorations, its successes were won through the hardest kind of work, and two lives were sacrificed to the advance of knowledge, those of the physician, Johan Svendsen, and the sailor, Ove Braskerud.

Captain Sverdrup was assisted in his work by fifteen men. Of these G. I. Isachsen was the cartographer, H. G. Simmons the botanist, Edvard Bay the zoologist, and Per Schei the geologist. A better fitted and a more loyal band of hard workers—both men of science and sailors—never explored unknown lands. They brought back the results and collections which are in the main described, either in English or German, in these four handsome volumes. It is a source of regret that Per Schei did not live to see the final working up of his grand geologic collections, since all attest that this warm-hearted man of science collected a vast mass of material; in fact, it may be said of him that he made accessible to paleontology and stratigraphy more information of an exact nature than all previous Arctic expeditions.

These four volumes, together with Captain Sverdrup's popular account, entitled "New Land" (2 volumes, 1904), should be in every scientific library, not only because of their great intrinsic value, but because we owe it to our Norwegian friends thus to show our appreciation of their splendid achievement.

The astronomical and geodetical observations are described by Isachsen (141 pages) and pictured on three large, topographically shaded maps, one of the most important results of the expedition. Terrestrial magnetism is treated by A. S. Steen (82 pages); the results here are important because the Sverdrup expedition worked for four years not far from the magnetic north pole. However, due to the lack of proper instruments and to other causes, the hoped-for results were not fully attained. The section on meteorology is by H. Mohn (399 pages) and consists of the facts gathered by the expedition, here detailed in tables presenting the atmospheric pressure, temperature of the air, humidity, winds, clouds, and precipitation.

All naturalists traveling in the far north are surprised by the extraordinary abundance of plants that come to life and bloom during the very short but extremely active growing season. Flowers may be gathered early in June, and for a month during June and July the plants grow day and night, because of the nightless days, and beautiful flowers of Alpine kinds may be collected within a few feet of the ice fields. There are no trees, and but few plants attain a foot in height, and yet in spots there is a green covering. Most of the plants grow in tufts and peripherally in small and large mounds. The entire growing season is less than four months long and yet during this time is made the necessary food on which the land animals subsist. Of these latter there are at least 30 kinds of insects, 7 spiders, 5 birds, and 9 mammals (polar bear, wolf, fox, ermine, glutton, lemming, hare, muskox, and reindeer). The two last named are large animals, and one wonders where they get sufficient food during the long winter.

The plant material gathered by Simmons amounts to over 50,000 specimens and is described in eight papers, though the marine algæ are not treated here. These results are a monument to the botanist's industry. Of fungi, E. Rostrup determines 80 forms. The lichens, in more than 7,000 specimens, are described by O. V. Darbishire, who states that they form the best collection ever made from the American Arctic. He describes 161 forms, and adds that about 253 lichens are now known from the region explored by the *Fram*. Among them is the food for reindeer and muskox. Of mosses, N. Bryhn describes 290 forms, of which 49 are new. The vascular plants (about 190 species) are determined by Simmons in three papers. Ellesmere Land alone has at least 115 flowering plants, and while in general this flora is a continuation of that of Greenland, yet there is a strong American trait (about 25 per cent.) that has come from the west. Curiously, the flora is most abundant on granite lands, richest on bird grounds and around Eskimo habitations, and least developed on Paleozoic limestone. An abundance of ground-water here as elsewhere is a first necessity.

The Eskimo and Arctic travelers are always interested in the stranded drift logs in these treeless lands, since at times and places drift-wood is common. Where does it come from? In some places good logs have been seen at elevations of about 300 feet above the sea. The Eskimo make their sledges, boats, and spears of them, since these cooled climates wood does not decompose and will remain intact indefinitely. The naturalist, however, is interested in their source. The *Fram* expedition collected 40 samples and these have been determined by F. Ingvarson, who tells us that there are three main sources for this wood, first, from the great Yenisei and Lena rivers of Siberia, second, from the St. Lawrence river, and finally, from the coast of Norway. Their distribution is brought about by the polar current drifting the Siberian woods, some across the north pole and others westward toward the east coast of Greenland, thence south and again north along the west coast of that country. The wood of the St. Lawrence is caught up by the Gulf Stream and drifted against Norway, where it gets mixed with Norwegian logs and both are borne westward against Greenland and so eventually attain Davis strait as far north as 62° 25′. In this way 31 species of forest trees may have attained the American Arctic archipelago (5 species of Siberian conifers and 6 of dicotyledons; 2 of Norwegian conifers and 9 of dicotyledons; and of American woods, 4 conifers and 5 dicotyledons). As conifers are most common in northern forests and float the longest, the dicotyledons soon becoming water-logged, they are the woods commonly met with in high Arctic regions.

In the summer time, Arctic waters are alive with migrant water birds, at least 18 species of which are here recorded. In this region they rear their young, and this means that the waters must be alive with animal food, a fact further attested by the former abundance of great migrant whales, and the presence of 5 species of native seals and of the walrus. The seals feed on fish and the walrus on molluscs, but the remainder subsist in the main on Crustacea. Of the latter, G. O. Sars describes no less than 154 kinds, among which the copepods (71 forms), amphipods (38), isopods (11), and ostracods (11) make up the bulk of the swimming invertebrate life. Back of all this animal life, however, there must be an abundance of plant life. Seaweeds are common enough below low-water mark, but the bulk of animal subsistence must be sought here, as elsewhere, in the phytoplankton, described in these reports by H. H. Gran. This author, however, states that the collections were wholly inadequate, and from the high seas, and that the actual Arctic phytoplankton was collected at but one place during middle August. J. A. Grieg describes 53 species of Mollusca and one of brachiopods, all from less than 150 feet of water. Of bottom-living Foraminifera, H. Kiær lists about 50 forms; and O. Nordgaard identifies 77 species of bryozoans, all of which are very different from those of Antarctic

waters. The Echinodermata, described by Grieg, include 2 crinids, 6 starfish, 6 ophiurids, strangely only 1 sea urchin, and 4 holothurians. The rest of the described marine fauna consists of 2 sponges, 4 actinians, 6 sea-squirts, 10 hydrids, 4 medusæ, and 44 kinds of polychæte worms. Clearly Arctic waters do not teem with a variety of animal life, but they make up for this in abundance of individuals.

The geologic results of Per Schei are very rich, not only in the abundance and variety of fossils gathered, but also in the record of the distribution of the various formations. Over the Archeozoic granites of Ellesmere Land lie about 14,000 feet of Paleozoic strata, beginning with Upper Cambrian, followed by basal Ordovician (Beekmantown), middle Ordovician, early and middle Silurian, and an extraordinary development of Devonian, having a thickness of about 6,000 feet (marine Lower and early Middle Devonian and an Upper Devonian fresh-water facies). The Carboniferous is known only in highest Pennsylvanian rocks, followed by marine Upper Triassic. Then there is no sedimentary record of any kind until the deposition of the Miocene fresh-water beds with lignites. As Per Schei died soon after the return of the expedition, the fossils are described by O. Holtedahl in three papers, one of which gives a summary of the geological results attained. The land plants of the Upper Devonian and the very few from the Miocene are described by A. G. Nathorst; the Devonian fishes by J. Kiær; the Devonian invertebrates by O. E. Meyer and S. Loewe; the Upper Carboniferous fauna by T. Tschernyschew and P. Stepanow; and the Triassic marine invertebrates by E. Kittl.

From Per Schei's account and the splendid photographs (the best Arctic pictures anywhere), it is evident that Ellesmere Land is an elevated and dissected table land, rising directly toward Greenland. Elevated strandlines and wave-cut terraces are seen along most shores, and are of various altitudes up to 570 feet. On one at 300 feet lie undecomposed driftwood and logs, attesting the recentness of some of this elevation.

Norsemen are still lovers of heroic work, and the north lands are their special scientific field. From them we are learning the geography, geology, and biology of the lands of the midnight sun on either side of Greenland, the territory of the Danes. We need, however, still more information about these almost inaccessible places, and let us hope that the Norwegians will soon extend their endeavors and modernize our knowledge of Nova Zembla.

Charles Schuchert

SPECIAL ARTICLES

COMPUTING AGES OF ANIMALS

In the various experiments on animals in regard to growth, nutrition, activity, reproduction, etc., it is necessary to determine the age of the individuals at various times in their lives. These computations, involving mere additions and subtractions, take a great deal of the experimenter's time. The task is monotonous and soon becomes a matter of great drudgery.

Having before me the task of making several thousand such computations I sought a means of obtaining this data in a quicker and less tedious manner. The instrument described and used by Minot in his work on the guinea pig appealed to me. It had, however, the objectionable feature that the age of but one animal could be ascertained at a time. As I was dealing with a pair of animals whose weights were made on the same day and whose ages were to be determined when litters were born it was necessary to devise a scheme whereby the ages of two individuals born on different days could be readily determined at various times in their lives.

The device finally hit upon is so simple to make and operate that I have deemed it worthy of a description in order that others who may be wrestling with such tedious computations may be relieved of their drudgery.

The device consists of three meter sticks, *M*, *A*, and *F*, with two guides, *G*, *G*. The middle meter stick and the two guides are fastened securely to a board and the other two meter sticks slide freely. To facilitate